Project Introduction

The proposed innovation is Spark-RS, an open source software project that enables GPU-accelerated remote sensing workflows in an Apache Spark distributed computing cluster. Current state-of-the-art parallel systems like Hadoop and Spark offer horizontally scalable analytics and reduced costs for enterprises, but weren't built to natively consume and process large remote sensing raster datasets. Conversely, GPUs can vastly accelerate image processing operations. Some open source projects have arisen that showcase hybrid Hadoop/GPU computing. However, there are no mature open source projects that utilize GPUs within Spark (an eventual replacement of MapReduce) and none that were built to process large remote sensing imagery. This is the primary role of the proposed innovation, Spark-RS. Spark-RS contains three primary components. One is a parallel large image loading component that quickly loads large multi-band imagery into a Spark cluster. The second component is a remote sensing library for Spark applications. It provides an API for reading and writing large images and wraps many common image operations from existing open source and NASA-built remote sensing libraries. The third component is a GPU management library for Spark. It simplifies and abstracts utilization of GPUs within a Spark application.

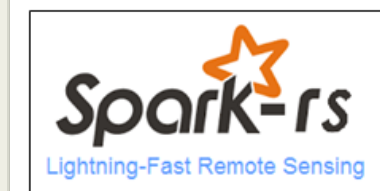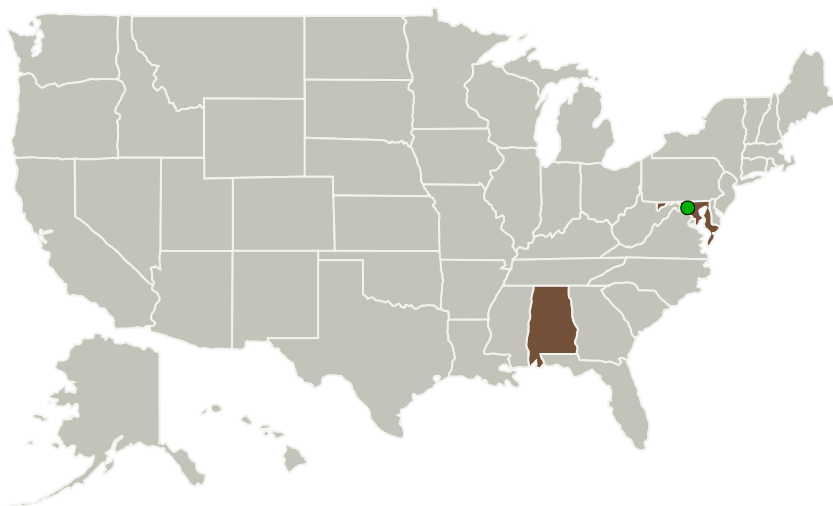## Primary U.S. Work Locations and Key Partners

SparkRS - Spark for Remote Sensing, Phase I

Table of Contents

Organizations Performing Work	Role	Type	Location
Spiritus, Inc	Lead Organization	Industry	HUNTSVILLE, Alabama
🟢 Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Alabama	Maryland

Project Transitions

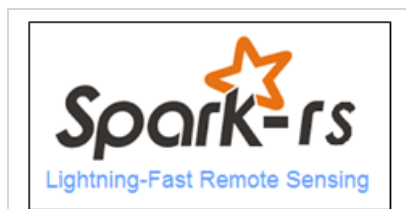▶ **June 2015:** Project Start

✓ **December 2015:** Closed out

Closeout Summary: SparkRS - Spark for Remote Sensing, Phase I Project Image

Closeout Documentation:
- Final Summary Chart Image*(https://techport.nasa.gov/file/139489)*

Images

Briefing Chart Image
SparkRS - Spark for Remote Sensing, Phase I
(https://techport.nasa.gov/image/135517)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Spiritus, Inc

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

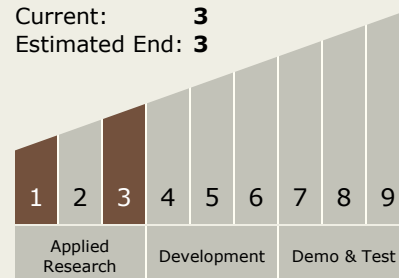**Program Director:**
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Todd Pehle

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**

1	2	3	4	5	6	7	8	9
Applied Research			Development			Demo & Test		

TechPort

Printed on 12/08/2022
11:12 AM UTC

For more information and an accessible alternative, please visit:
https://techport.nasa.gov/view/33623

Page 2

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  └ TX11.4 Information Processing
    └ TX11.4.2 Intelligent Data Understanding

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System